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10/042,010	01/08/2002	Vladimir Jakubek	END920010045US1 (IEN-10-5	4928

EXAMINER	
HAMILTON, CYNTHIA	

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DATE MAILED: 03/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/042,010	JAKUBEK ET AL.	
	Examiner	Art Unit	
	Cynthia Hamilton	1752	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 December 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23 and 25-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *32* is/are allowed.

6)☒ Claim(s) *1-21,23,25-28 and 30* is/are rejected.

7)☒ Claim(s) *22,29 and 31* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The amendment filed December 11, 2003 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows:

"GE stands for glycidyl ether

TGE stand for tris (or tri) glycidyl ether,

BPA stands for bisphenyl-A".

Applicant has not pointed out where the new amended material is supported, nor does there appear to be a written description of these additions in the application as filed. The examiner notes that perhaps applicants intended "BPA stands for bisphenol-A".

Applicant is required to cancel the new matter in the reply to this Office Action.

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-14 and 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claims 1-7, and 20, the polymer claimed is limited to a "photoimaged polymer" (claims 1-7) or a "photoimaged dielectric polymer"(claims 20). The examiner is not sure what is the limit intended by "photoimaged" with respect to a polymer.

Photoimaging is a process of forming an image. A polymer does not have inherently a structure of this nature associated with it. A layer can be imaged, e.g. photoimaged, and have distinct areas of one part of the image and parts of another. Applicants do not define what "photoimaged" means. Applicants reference using photoimageable dielectrics then disclose processes that would optionally generate an image, i.e. those in which "exposing at least a portion of a layer" is limited to exposing that only exposes a portion followed by removal of the unexposed portion. It is not clear from the original disclosure if "photoimaged" means such an image is formed or that only exposing of the polymer, layer, etc, to actinic radiation has occurred. Even if this were made clear, the examiner is not sure how "photoimaged" could be used to limit a polymer which by its very nature is not large enough to be imaged in the manner set forth by applicants. Thus, what is meant by the limit "photoimaged" is unclear on the record. Is it the final product of imaging a material or is it something less such as indicated by "exposing at least a portion of a layer" when all of the layer could be exposed. Because of this confusion, the "photoimaged and fully cured dielectric polymeric film" of claims 8-14 are also found confusing. Is a dielectric polymeric film with a pattern in it claimed or is a film which has been exposed to actinic radiation and fully cured claimed which would include both imaged and unimaged layers. Applicants in claim 27 make clear in the processes of claims 21-23, 25-27, that the process of making a photoimaged dielectric is not limited to removing unexposed material since this step is added in a dependent claim. However, the process of claims 21-23, 25-27 is as broad as that claimed. There is no clear indication that "the process of making a photoimaged dielectric" is a process which actually finishes with a photoimaged dielectric. It is only a process that moves to that direction. The preamble here does not further limit the process claimed. The

same is true of the processes of claims 28-32. The examiner notes for the record that in the prior art "photoimaged" is associated with forming an image in a dielectric layer to form holes in the layer as set forth in Ilardi et al (4,999,740) in the second full paragraph in column 3 and in Johnson et al (5,288,377), fourth full paragraph in column 3. To photoimage is a species of imaging as with forming a photograph through imaging a film with light. The examiner notes that photoimaging is often described as imaging with actinic radiation, but the prior art recognizes to photoimage as to form an image into a substrate with actinic radiation. If applicants only mean to expose to actinic radiation by this term, then it is used in a much broader sense than is generally recognized in the art as noted by Davis et al (5,679,444) in col. 4, third full paragraph, as shown below, wherein a clear distinction is made between the use of photoimaged screens with nonphotoimageable dielectric materials.

> Polymeric dielectrics are used as insulation layers between the multiple power and signal planes of a multi-layer electronic circuit package. Many suitable dielectric materials are commercially available, including photoimageable ones and nonphotoimageable ones. The dielectric material typically will have a dielectric constant of 3.2 or less to reduce signal propagation delays and to reduce signal noise. The selected dielectric may be applied in one of several ways, including lamination, spraying, screening, or dipping. If screening is performed using a nonphotoimageable dielectric, photoimaged screens should be used to eliminate subsequent drilling to form vias. Dielectric coatings are well-known in the art. See, for example, Brauer, et al., U.S. Pat. No. 5,153,986 and Bindra, et al., U.S. Pat. No. 5,229,550. Examples of suitable dielectrics include, but are not limited to fluoropolymers.

Thus, claims 1-14 and 20 are found indefinite.

5. Claims 1-20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. All of instant claims 1-20

and 32 have a limit of a polymer or polymeric film or photoimagable dielectric which has "a fatigue life of at least about 10,000 cycles when measured at about a 3% strain." Applicants disclose only one test for "flex fatigue life" in their specification. There is more than one recognized manner of testing "flex fatigue life" known in the art. The examiner cites Fjelstad to show just four of which as far as the examiner can determine applicants are using "The Fatigue Ductility Flex Tester". "Fatigue Life" is "Number of cycles of fluctuating stress and strain of a specified nature that a material will sustain before failure occurs. Fatigue life is a function of the magnitude of the fluctuating stress, geometry of the of the specimen and test conditions" as set forth by Instron. According to Fisck Alloy Conductors, Inc. "Flex life - (or flex fatigue life) is the number of cycles a sample can withstand when subjected to a repetitive stress or strain before failure." They go on to disclose "Flex life results are not "exact" as the range of results within a test group, between test groups and between test apparatus often produces a large standard deviation. Hence there are no standard values to use for comparison." The examiner does note that Fisk seems to be interested in metals. Thus, for the test to be of value in testing materials side by side, it must be fully set forth. Applicants do not refer to a standard for how their test will be run, but disclose the test on page 14. They do not set forth what "sample failure" means. On page 18, they note that some cycles are counted until failure at one mandrel size, i.e. note 3, but some cycles are counted as "cycles to fail at 3.0 % strain from cycles to fail vs. % strain curve. There is no disclosure as to how this strain number is obtained or how the strain curve is obtained. There is no disclosure as to what weight is used in the "flex fatigue tester" of page 14 or which "flex fatigue tester" is used. The examiner notes that "such as Model 2FDF Fatigue Ductility Flex Tester available from Jovil/Universal Manufacturing Company in Danbury,

Connecticut" does not say that that was the flex fatigue tester to be used or was used. Mil-P-50884C on page 42 wherein the Model 2FDF Fatigue Ductility Flex Tester is used for testing printed wiring references on page 12 at 3.6.6.1 looks to electrical discontinuity, short circuits, degradation or rejectable delamination as failure, but applicants have no circuit to test or check for failure. IPC-TM-650 using the same machine as cited by applicants also address at 5.2.3 electrical discontinuity as failure and at 5.3.3 reference how to extrapolation to other bend radii or fatigue lives, i.e. at different diameter mandrels. On page 42, of Mil-P-50884C, there is requirement that not only number of flex cycles, diameter of mandrel, and travel of loop be specified but that flexing rate and points of application also be specified. A conductivity failure is set forth by Dueber et al (5,536,620) in their Flex/Bend Test in col. 13 using the same machine. Bryant et al (4,684,420) while testing with an MTS flex tester considered crack to be failure with their paints. Applicants have not set forth the solvent used to make the layers tested, nor have they set forth the thickness of layers tested, nor have they set forth how to standardize to 3% strain for comparison. In view of all of applicant's failure to set forth enough test criteria to allow a worker of skilled in the art to repeat the standard applicants have failed to enable said worker to know where the limits of their invention lay. The tests run are on two different standards neither of which is clear as to how it is run and they have failed to explain how the two standards compare with respect to the cycle numbers given. Thus, because applicants have given insufficient information with respect to their flex fatigue life test, claims 1-20 are non enabled.

6. Applicant's arguments filed December 11, 2003 have been fully considered but they are not persuasive. Applicants argue that their test procedures on page 14 are sufficiently detailed to permit one skilled in the art to duplicate the tests. The examiner disagrees for the reasons

already given above in the non enabling rejection of claims 1-20. Applicants do not identify sufficient conditions of their fatigue test on page 14 to allow applicants to reproduce the fatigue tests in order to determine "a fatigue life of at least about 10,000 cycles when measured at about a 3% strain" has been reached or not. The disclosure does not define the size of mandrel to use, the solvent used to make the layers tested, the exact thickness of the layers required, nor have they set forth how to standardize to 3% strain for comparison. Thus, there is insufficient disclosure in the specification to enable a worker of ordinary skill in the art to replicate the fatigue tests to determine when applicant's claimed invention has been obtained. The rejection stands with respect to claims 1-20. Claims 31-32 require only an improvement in flex fatigue life. The examiner holds there is sufficient disclosure to enable such a showing.

7. Claims 1-3, 8-10 and 15-16 are rejected under 35 USC 102(b0 as being anticipated by Williamson et al (5,730,764). The rejection stands as set forth in the last Office Action in paragraph 10 dated August 13, 2003.

8. Applicant's arguments filed December 11, 2003 have been fully considered but they are not persuasive. The cured composition of Williamson et al is made from one of applicants' choices of component, i.e. Tactix 742, and a Tg within the range required. Applicants have cited Continental Can Co. vs. Monsanto co, 20 USPQ 2d, 1746, 1749 (Fed. Cir. 1991), but this case is not to point in this application because the issue of inherency in that application was the presence of a hollow core and the inherency of the process used which would generate such a core. The issue in this application is whether the cured material of Williamson et al inherently possesses the required fatigue limit. In view of the same Taxtix 742 being used and a diglycidyl bisphenol ether being used along with a photoacid generator to form the polymer in question and

that the polymer has a Tg greater than 140 degrees C, the number of examples set forth by applicants in their showing which clearly fit this criteria are Examples 27-33 where trends of fatigue with respect to the use of diglycidyl bisphenols with Tactix 742 are shown. Even then applicants have not clearly identified the diglycidyl bisphenols as such and they do not distinguish one DGEBPA in their tests from another. Thus, a worker of ordinary skill in the art would assume that using the same materials disclosed in the claim language and photocuring them in the same fashion would yield materials of the same general physical characteristics. The issue is whether the cured polymer of the Tactix 742 (75)/ DER 383 (25)/OPPI 2 phr in Williamson et al would have the same properties as that of applicants with respect to fatigue. That the material of Williamson et al has a fatigue limit is not in question. The issue is what is that limit. The issue in the Contental Can case was whether there was a hollow center at all. Did the process used form a hollow center? In this application, the material of Williamson et al does have a fatigue limit. The sole issue is what it is. This issue is dependent upon the test procedures used and thus the fatigue limit is a test of the cured product. Thus, applicants are defining their composition by its inherent properties. The examiner in looking at the comparisons made by applicants note that they have not tested a sample in the range set forth by Williamson et al. Applicants have shown in examples 27-33 that there is no trend in fatigue with respect to the amount of Tactix component present. The rejection stands.

9. Claim 28 is objected to because of the following informalities: Claim 28 has a period embedded in it at the bottom of page 11 in the last response. Appropriate correction is required.

10. Claims 28 and 30 are rejected under 35 U.S.C. 102(a or e) as being anticipated by Day et al (5,278,010). With respect to instant claims 28 and 30, the processes of Day et al wherein the

polyol resin is the condensation product of epichlorohydrin and bisphenol A, i.e. instant "condensation product of a bisphenol and an epihalohydrin", and epoxidized octafunctional bisphenol A formaldehyde novolak resin, i.e. polyfunctional epoxy resin anticipate the instant process. Table III shows mixtures of PKHC at 50 parts and SU-8 at 50 parts being used to form imaged layers with 5 parts UVE 1014 which is disclosed to be a sulfonium photoacid. This composition along with the intended use in forming solder masks as set forth in col. 5-6 of Day et al anticipate the instant processes. A third resin is also added as set forth in Table 1 of Day et al. It is EpiRez 5183 which is disclosed to have a weight per epoxide of 675 in col. 3, lines 30-33. If EpiRez 5183 is taken as the instant "condensation product of a bisphenol and an epihalohydrin" because it is made from a tetrabromo bisphenol A and epichlorohydrin to make the glycidyl ether groups then Table one has a resin mixture of EpiRez 5183 and SU-8 which is 50 parts to 30 parts by weight, respectively with 5 parts per 100 wt of resin then the imaging of this combination reads on the method as well. If PKHC and EpiRez 5183 combined as instant "condensation product of a bisphenol and an epihalohydrin" then the SU-8 is the instant polyfunctional epoxy resin then Example 1 in Table I of Day et al reads on the instant invention.

11. Applicant's arguments filed December 11, 2003 have been fully considered but they are not persuasive. Applicants argue with respect to the rejection of claims 28 and 30 as anticipated by Day to be no longer applicable in view of their addition to the process of claim 28 that the photoimagable polymer be "capable of forming a film having a glass transition temperature of at least about 140 ° C". This is in a "process for using a photoimagable polymer capable of forming a film having a glass transition temperature of at least about 140°C". The process does not require that the photoimagable polymer ever be used to make a film with a glass transition

temperature of at least about 140°C nor a polymer with said glass transition temperature. All that is required is that the process use a photoimagable polymer capable of such a temperature. The examiner holds that the polyfunctional epoxy resin of is capable of doing such if mixed with the proper other resins and cured. The addition of this claim language is to intended use of the photoimagable polymers used in the process set forth. The limit is not part of the process except as a definition of the kind of resins selected for use. The rejection stands with respect to instant claims 28 and 30.

12. Claims 21, 23, 25-28, 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Foster et al (6,528,218 B1). The rejection stands for reasons of record set forth in the Office action of August 13, 200 in paragraph 14.

13. Claims 21, and 25-27 are rejected under 35 U.S.C. 102(e) as being anticipated by Foster et al (6,528,218 B1). The). The rejection stands with respect to instant claims 21 and 24-27 for reasons of record set forth in the Office action of August 13, 200 in paragraph 15.

14. Applicant's arguments filed December 11, 2003 have been fully considered but they are not persuasive. Applicants reference flexibility limits as the reason to remove rejections with respect to Foster et al. There are no such limits in instant claims 21, 23, 25-28 and 30. There is a clear showing of a material that cures to a Tg of 140 degrees C. Thus, with respect to instant claims 21, 23-28 and 30 the rejections over Foster et al are maintained.

15. Claim 8 is rejected under 35 U.S.C. 102(b) as being anticipated by Janke et al (5,726,216). The last Prepeg Resin system in Table 5 of Janke et al has a TG of 144° C and inherently has a fatigue life of at least about 10,000 cycles when measured at about a 3% strain. Tactix 742 is the same trifunctional epoxy resin used by applicants and Ekp 207 is an epoxidized

rubber and OPPI is a photocationic agent. The cured material is as inherently as photoimaged as the cured layers of applicants. In Janke et al, see particularly Abstract, col. 4, lines 42-47, paragraph at end of col. 5, col. 6, col. 9-10. Janke et al discloses the desire to obtain flexible materials and sets out to do so by using flexible molecules as set forth in col. 9-10. Thus, with respect to claim 8, workers of ordinary skill in the art would expect the materials of Janke et al to be flexible and have high Tg's. In col. 2, lines 34-55, of Janke et al, they are trying to overcome the very brittle nature of radiation cured epoxy resins.

16. Applicant's arguments filed December 11, 2003 have been fully considered but they are not persuasive. Applicants argue with respect to Janke et al because applicants have tested many resins that "The properties of Janke et al are somehow inherently superior to over 90% of the specimens that were tested and that were listed in applicants' specification as having failed the flex test" is not supportable. The examiner believes since Janke et al set out to solve the same general problem of brittle radiation cured epoxy resins as did applicants that Janke et al is properly applied. That applicants used a different physical test than Janke et al to identify when their cured materials were no longer brittle is the issue. The intend of finding a less brittle material is the same and thus inherency is an issue. The rejection is properly made and stands.

17. Claims 22, 29 and 31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

18. Claim 32 is allowed.

19. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cynthia Hamilton whose telephone number is 571-272-1331. The examiner can normally be reached on Monday through Friday from 8:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff, can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Cynthia Hamilton

CYNTHIA HAMILTON
PRIMARY EXAMINER

March 8, 2004

Cynthia Hamilton
Primary Examiner
Art Unit 1752